

CLAIMS

What is claimed is:

1. A method of making a bonded abrasive tool, comprising the steps of:
 - a) selecting a fritted vitreous bond composition that includes zinc oxide and
5 at least two alkali metal oxides;
 - b) combining a superabrasive grain component, a filler component having hollow bodies and the vitreous bond composition; and
 - c) firing the combined components at a temperature in a range of between about 600°C and about 850°C.
- 10 2. The method of Claim 1, where the combined components are fired at maximum temperature for a period of time in a range of between about 2 hours and about 7 hours.
3. The method of Claim 2, wherein the combined components are fired in an ambient air atmosphere.
- 15 4. The method of Claim 3, wherein the superabrasive grain component is present in an amount in a range of between about 5 and about 50 percent by volume.
5. The method of Claim 4, wherein the vitreous bond component is present in a range of between about 14 and about 28 percent by volume.
6. The method of Claim 5, wherein the hollow bodies are present in an amount in a
20 range of between about 10 and about 30 percent by volume.

7. The method of Claim 6, wherein the tool further comprises an open porosity of at least 15 percent, by volume.
8. The method of Claim 1, wherein the amount of combined alkali metal oxides is in a range between about 5 and about 15 percent by weight of the vitreous bond component.
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9. The method of Claim 8, wherein the amount of combined alkali metal oxides is in a range between about 8 and about 12 percent by weight of the vitreous bond component.
10. The method of Claim 8, wherein the amount of zinc oxide is in a range between about 1 and about 6 percent by weight of the vitreous bond component.
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11. The method of Claim 10, wherein the amount of zinc oxide is in a range between about 2 and about 4 percent by weight of the vitreous bond component.
12. The method of Claim 11, wherein the vitreous bond component further includes barium oxide, and wherein the combined amount of zinc oxide and barium oxide is at least about 5 weight percent of the vitreous bond component.
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13. The method of Claim 1, wherein the hollow bodies are screened to remove broken particles.
14. The method of Claim 1, further comprising the step of hot pressing or cold pressing, wherein at least about 90 percent by weight of the hollow bodies are intact following pressing.
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15. The method of Claim 1, wherein the fired components are cemented to a metallic core.
16. A method of making a bonded abrasive tool, comprising the steps of:
 - 5 a) combining a superabrasive grain component, present in an amount of at least about 5 percent by volume, a filler component having hollow bodies and present in an amount of at least about 10 percent by volume, and a vitreous bond component that includes zinc oxide and at least two alkali metal oxides, the vitreous bond component present in an amount less than about 28 percent by volume;
 - 10 b) molding the combined components at pressure effective to avoid crushing more than about 10% by weight of the hollow bodies; and
 - c) firing the combined components at a temperature in a range of between about 600°C and about 850°C, for a period of time sufficient to form a bonded abrasive tool having a porosity of at least about 15 percent.
- 15 17. The abrasive tool of Claim 16 wherein the bonded abrasive tool is molded to form a rim and the rim is attached to a core.